

## CLAIMS

What is claimed is:

- 1 1. A method for managing access to a resource, the method comprising the  
2 computer-implemented steps of:  
3 sending from a requestor to a master of the resource a lock  
4 mode request for a lock mode on the resource;  
5 receiving the resource at the requestor from a holder of the  
6 resource; and  
7 accessing the resource as if the requestor had been granted the  
8 lock mode request without waiting to receive an express  
9 lock mode grant from the master.
- 1 2. The method of Claim 1 further comprising the computer-  
2 implemented steps of:  
3 detecting whether the step of receiving the resource at the  
4 requestor will occur; and  
5 if the requestor does receive the resource  
6 sending a lock assume message from the requestor to the  
7 master to inform the master that the requestor has  
8 assumed the lock mode relative to the resource.
- 1 3. A method for managing access to a resource, the method comprising the  
2 computer-implemented steps of:

3 receiving at a holder an inform lock holder message that a  
4 requestor needs the resource, where the holder currently  
5 holds the resource and a first lock mode on the resource;  
6 transferring the resource to the requestor in response to  
7 receiving the inform lock holder message without  
8 sending a status message to a master of the resource  
9 wherein the status message is a down-convert message  
10 or a release lock message; and  
11 updating a lock mode record, maintained by the holder, to  
12 indicate that the holder has down-converted from the  
13 first lock mode to a second lock mode for the resource.

1 4. The method for Claim 3 further comprising the computer-implemented steps  
2 of:  
3 sending an update lock message to the master wherein  
4 the update lock message indicates the second  
5 lock mode for the resource.

1 5. The method for Claim 3 further comprising the computer-implemented steps  
2 of:  
3 receiving at the holder a message from a sender;  
4 wherein the message includes a third lock mode  
5 on the resource;

6 detecting that the first lock mode and the third lock  
7 mode do not match; and  
8 sending a lock status message to the sender;  
9 wherein the lock status message includes the first  
10 lock mode.

1 6. The method for Claim 3 further comprising the computer-implemented steps  
2 of:

3 receiving at the holder a single batched inform lock  
4 holder message that contains all information  
5 necessary to transfer the resource to a plurality of  
6 requestors; and  
7 transferring the resource to the plurality of requestors.

1 7. The method for Claim 3 further comprising the computer-implemented steps  
2 of:  
3 sending a lock access message from the holder to a master.

1 8. A method for managing access to a resource, the method comprising the  
2 computer-implemented steps of:  
3 receiving at a master a request message which indicates that a  
4 requestor needs a particular resource of a plurality of  
5 resources, where the master maintains a plurality of lock

6 mode records corresponding to the plurality of  
7 resources;  
8 sending from the master to a holder an inform lock holder  
9 message to indicate to the holder that the requestor  
10 needs the particular resource;  
11 receiving a lock access message from the requestor where the  
12 lock access message indicates that the requestor has  
13 assumed a lock mode relative to the particular resource;  
14 and  
15 performing an update to a particular lock mode record of the  
16 plurality of lock mode records in response to receiving  
17 the lock access message;  
18 wherein the update indicates that the requestor has  
19 assumed the lock mode on the particular  
20 resource.

1 9. A method for Claim 8 wherein the computer-implemented step of performing  
2 an update to a particular lock mode record of the plurality of lock mode  
3 records in response to receiving the plurality of lock mode records in  
4 response to receiving the lock access message:  
5 is performed prior to receiving any status message from the  
6 holder relating to the particular resource;  
7 wherein the status message is a down-convert

8 message or a release lock message.

1 10. A method for Claim 8 wherein the computer-implemented step of performing  
2 an update to a particular lock mode record of the plurality of lock mode  
3 records in response to receiving the plurality of lock mode records in  
4 response to receiving the lock access message:  
5 is performed without receiving the status message from

6 the holder relating to the particular resource;

7 wherein the status message is a down-convert  
8 message or a release lock message.

1 11. The method for Claim 8 further comprising the computer-  
2 implemented step of:  
3 receiving at the master a plurality of request

4 messages which indicate that a plurality of requestors  
5 need the particular resource; and

6 sending from the master to the holder the inform

7 lock holder message wherein the inform lock holder  
8 message contains all information from the plurality of  
9 request messages that is necessary for the holder to  
10 transfer the particular resource to the plurality of  
11 requestors.

1 12. The method for Claim 8 further comprising the computer-  
2 implemented step of:  
3 receiving at the master a message from a sender;  
4 wherein the message includes a second lock mode on  
5 the particular resource;  
6 detecting that the lock mode and the second lock mode do  
7 not match; and  
8 sending a lock status message to the sender;  
9 wherein the lock status message includes the lock  
10 mode.

1 13. The method for Claim 8 further comprising the computer-  
2 implemented step of:  
3 receiving at the master a second request message;  
4 wherein the request message and the  
5 second request message both  
6 contain requests for the resource  
7 in exclusive lock mode; and  
8 queueing the second request message until the master  
9 receives the lock access message from the  
10 requestor.

1 14. A method for managing access to a resource, the method comprising the  
2 computer-implemented steps of:  
3 receiving at a master a request message which indicates that a  
4 requestor needs a particular resource of a plurality of  
5 resources, where the master maintains a plurality of lock  
6 mode records corresponding to the plurality of  
7 resources;  
8 designating one holder out of a plurality of holders wherein the  
9 plurality of holders all have respective lock modes for  
10 the particular resource;  
11 sending a plurality of broadcast inform lock holder messages to  
12 the plurality of holders except for the one holder  
13 indicating that the requestor needs the particular  
14 resource;  
15 receiving a plurality of update lock messages from the plurality  
16 of holders except for the one holder;  
17 wherein the a plurality of update lock messages  
18 indicates the respective lock modes of the  
19 plurality of holders;  
20 sending from the master to the one holder an inform lock holder  
21 message to indicate to the one holder that the requestor  
22 needs the particular resource;

23 receiving a lock access message from the requestor where the  
24 lock access message indicates that the requestor has  
25 assumed a lock mode relative to the particular resource;  
26 and  
27 performing an update to a particular lock mode record of the  
28 plurality of lock mode records in response to receiving  
29 the lock access message without receiving a status  
30 message;  
31 wherein the status message is a down-convert message  
32 or a release lock message;  
33 wherein the update indicates that the requestor has  
34 assumed the lock mode on the particular  
35 resource.

- 1 15. A computer system comprising:  
2 a processor;  
3 a memory having stored instructions of the computer system causing the  
4 processor to perform the computer-implemented steps of:  
5 sending from a requestor to a master of a  
6 resource a lock mode request for the lock  
7 mode on the resource;  
8 receiving the resource at the requestor from a  
9 holder of the resource; and



10                   accessing the resource as if the requestor had  
11                   been granted the lock mode request  
12                   without waiting to receive an express  
13                   lock mode grant from the master.

1   16.   The computer system of Claim 15 wherein the memory having  
2       stored instructions of the computer system causing the  
3       processor to perform the computer-implemented steps further  
4       comprising the computer-implemented step of:  
5       detecting whether the step of receiving the resource at the  
6               requestor will occur; and  
7       if the requestor does receive the resource;  
8               sending a lock assume message from the requestor to  
9               the master to inform the master that the  
10       requestor has assumed the lock mode relative to  
11       the resource.

1   17.   A computer system comprising:  
2       a processor;  
3       a memory, coupled to the processor,  
4       containing:  
5               a particular lock mode record of a plurality of lock mode

6 records corresponding to a lock mode of a particular resource  
7 of a plurality of resources, where a master maintains the  
8 plurality of lock mode records corresponding to the plurality  
9 of resources;  
10 having stored instructions of the computer system causing the  
11 processor to perform the computer-implemented steps of:  
12 receiving at the master a request message which  
13 indicates that a requestor needs the  
14 particular resource of the plurality of  
15 resources, where the master maintains the  
16 plurality of lock mode records  
17 corresponding to the plurality of  
18 resources;  
19 sending from the master to a holder an inform  
20 lock holder message to indicate to the  
21 holder that the requestor needs the  
22 particular resource;  
23 receiving a lock access message from the  
24 requestor where the lock access message  
25 indicates that the requestor has assumed  
26 the lock mode relative to the particular  
27 resource; and  
28 performing an update to the particular lock

29 mode record of the plurality of lock  
30 mode records in response to receiving the  
31 lock access message without receiving a  
32 status message;  
33 wherein the status message is a  
34 down-convert message or  
35 a release lock message;  
36 wherein the update indicates that  
37 the requestor has assumed  
38 the lock mode on the  
39 particular resource.

1 18. The computer system for Claim 17 wherein the computer-  
2 implemented step of performing an update to a particular lock  
3 mode record of the plurality of lock mode records in response to  
4 receiving the lock access message:  
5 is performed prior to receiving any status message from  
6 the holder relating to the particular resource  
7 wherein the status message is a down-convert  
8 message or a release lock message.

1 19. The computer system for Claim 17 wherein the computer-

implemented step of performing an update to a particular lock mode record of the plurality of lock mode records in response to receiving the plurality of lock mode records in response to receiving the lock access message:

is performed without receiving the status message from the holder relating to the particular resource wherein the status message is a down-convert message or a release lock message.

20. The computer system of Claim 17 wherein the memory having stored instructions of the computer system causing the processor to perform the computer-implemented steps further comprising the computer-implemented step of:

receiving at the master a plurality of request messages which indicate that a plurality of requestors need the particular resource; and

sending from the master to the holder the inform lock holder message wherein the inform lock holder message contains all information from the plurality of request messages that is necessary for the holder to transfer the particular resource to the plurality of requestors.

1 21. The computer system of Claim 17 wherein the memory having  
2 stored instructions of the computer system causing the  
3 processor to perform the computer-implemented steps further  
4 comprising the computer-implemented step of:  
5 receiving at the master a message from a sender;  
6 wherein the message includes a second lock  
7 mode on the particular resource;  
8 detecting that the lock mode and the second lock mode do  
9 not match; and  
10 sending a lock status message to the sender  
11 wherein the lock status message includes the lock  
12 mode.

1 22. The computer system for Claim 17 further comprising the  
2 computer- implemented step of:  
3 receiving at the master a second request message  
4 wherein the request message and the  
5 second request message both contain requests for the  
6 resource in exclusive lock mode; and  
7 queueing the second request message until the master  
8 receives the lock access message from the requestor.

1 23. A computer system comprising:

2 a processor;  
3 a memory, coupled to the processor,  
4 containing:  
5 a particular lock mode record of a plurality of lock mode  
6 records corresponding to a lock mode of a particular resource  
7 of a plurality of resources, where a master maintains the  
8 plurality of lock mode records corresponding to the plurality  
9 of resources;  
10 having stored instructions of the computer system causing the  
11 processor to perform the computer-implemented steps of:  
12 receiving at a master a request message which  
13 indicates that a requestor needs the  
14 particular resource of the plurality of  
15 resources, where the master maintains the  
16 plurality of lock mode records  
17 corresponding to the plurality of  
18 resources;  
19 designating one holder out of a plurality of  
20 holders wherein the plurality of holders  
21 all have respective lock modes for the  
22 particular resource;  
23 sending a plurality of broadcast inform lock

24 holder messages to the plurality of  
25 holders except for the one holder  
26 indicating that the requestor needs the  
27 particular resource;  
28 receiving a plurality of update lock messages  
29 from the plurality of holders except for  
30 the one holder  
31 wherein the plurality of update lock  
32 messages indicates the respective  
33 lock modes of the plurality of  
34 holders;  
35 sending from the master to the one holder an  
36 inform lock holder message to indicate  
37 to the one holder that the requestor needs  
38 the particular resource;  
39 receiving a lock access message from the  
40 requestor where the lock access message  
41 indicates that the requestor has assumed  
42 the lock mode relative to the particular  
43 resource; and  
44 performing an update to the particular lock  
45 mode record of the plurality of lock mode  
46 records in response to receiving the lock

47 access message without receiving a status  
48 message;  
49 wherein the status message is a  
50 down-convert message  
51 or a release lock message;  
52 wherein the update indicates that  
53 the requestor has assumed  
54 the lock mode on the  
55 particular resource.

1 24. A computer system comprising:  
2 a processor;  
3 a memory, coupled to the processor,  
4 containing:  
5 a resource and a first lock mode on the resource; and  
6 a lock mode record associated with the resource;  
7 having stored instructions of the computer system causing the  
8 processor to perform the computer-implemented steps of:  
9 receiving at a holder an inform lock holder  
10 message that a requestor needs the  
11 resource, where the holder currently  
12 holds the resource and the first lock mode  
13 on the resource;



14 transferring the resource to the requestor in  
 15 response to receiving the inform lock  
 16 holder message without sending a status  
 17 message to a master of the resource  
 18 wherein the status message is a down-  
 19 convert message or a release lock  
 20 message; and  
 21 updating the lock mode record, maintained by  
 22 the holder, to indicate that the holder has  
 23 down-converted from the first lock mode  
 24 to a second lock mode for the resource.

1 25. The computer system of Claim 24 wherein the memory having stored  
 2 instructions of the computer system causing the processor to perform the  
 3 computer-implemented steps further comprising the computer-implemented  
 4 steps of:

5 sending an update lock message to the master wherein  
 6 the update lock message indicates the  
 7 second lock mode for the resource.

1 26. The computer system of Claim 24 wherein the memory having  
 2 stored instructions of the computer system causing the

3 processor to perform the computer-implemented steps further  
4 comprising the computer-implemented steps of:  
5 receiving at the holder a message from a sender;  
6 wherein the message includes a third lock mode  
7 on the resource;  
8 detecting that the first lock mode and the third lock  
9 mode do not match; and  
10 sending a lock status message to the sender,  
11 wherein the lock status message includes the  
12 first lock mode.

- 1 27. The computer system of Claim 24 wherein the memory having  
2 stored instructions of the computer system causing the  
3 processor to perform the computer-implemented steps further  
4 comprising the computer-implemented steps of:  
5 receiving at the holder a single batched inform lock  
6 holder message that contains all information  
7 necessary to transfer the resource to a plurality of  
8 requestors; and  
9 transferring the resource to the plurality of requestors.
- 1 28. A computer-readable medium carrying one or more sequences of instructions  
2 for managing access to a resource, wherein execution of the one or more

3 sequences of instructions by one or more processors causes the one or more  
4 processors to perform the steps of:  
5 sending from a requestor to a master of the resource a lock  
6 mode request for a lock mode on the resource;  
7 receiving the resource at the requestor from a holder of the  
8 resource; and  
9 accessing the resource as if the requestor had been granted the  
10 lock mode request without waiting to receive an express  
11 lock mode grant from the master.

1 29. The computer-readable medium of Claim 28 further comprising  
2 the sequence of instructions for performing the steps of:  
3 detecting whether the step of receiving the resource at the  
4 requestor will occur; and  
5 if the requestor does receive the resource;  
6 sending a lock assume message from the requestor to the  
7 master to inform the master that the requestor has  
8 assumed the lock mode relative to the resource.

1 30. A computer-readable medium carrying one or more sequences of instructions  
2 for managing access to a resource, wherein execution of the one or more  
3 sequences of instructions by one or more processors causes the one or more  
4 processors to perform the steps of:

5 receiving at a holder an inform lock holder message that a  
6 requestor needs the resource, where the holder currently  
7 holds the resource and a first lock mode on the resource;  
8 transferring the resource to the requestor in response to  
9 receiving the inform lock holder message without  
10 sending a status message to a master of the resource  
11 wherein the status message is a down-convert message  
12 or a release lock message; and  
13 updating a lock mode record, maintained by the holder, to  
14 indicate that the holder has down-converted from the  
15 first lock mode to a second lock mode for the resource.

1 31. The computer-readable medium of Claim 30 further comprising the sequence  
2 of instructions for performing the steps of:  
3 sending an update lock message to the master wherein  
4 the update lock message indicates the second  
5 lock mode for the resource.

1 32. The computer-readable medium of Claim 30 further comprising sequences of  
2 instructions for performing the steps of:  
3 receiving at the holder a message from a sender;  
4 wherein the message includes a third lock mode  
5 on the resource;

6 detecting that the first lock mode and the third lock  
7 mode do not match; and  
8 sending a lock status message to the sender;  
9 wherein the lock status message includes the first  
10 lock mode.

1 33. The computer-readable medium of Claim 30 further comprising sequences of  
2 instructions for performing the steps of:  
3 receiving at the holder a single batched inform lock  
4 holder message that contains all information  
5 necessary to transfer the resource to a plurality of  
6 requestors; and  
7 transferring the resource to the plurality of requestors.

1 34. The method for Claim 30 further comprising the computer-implemented  
2 steps of:  
3 sending a lock access message from the holder to a master.

1 35. A computer-readable medium carrying one or more sequences of instructions  
2 for managing access to a resource, wherein execution of the one or more  
3 sequences of instructions by one or more processors causes the one or more  
4 processors to perform the steps of:

5 receiving at a master a request message which indicates that a  
6 requestor needs a particular resource of a plurality of  
7 resources, where the master maintains a plurality of lock  
8 mode records corresponding to the plurality of  
9 resources;  
10 sending from the master to a holder an inform lock holder  
11 message to indicate to the holder that the requestor  
12 needs the particular resource;  
13 receiving a lock access message from the requestor where the  
14 lock access message indicates that the requestor has  
15 assumed a lock mode relative to the particular resource;  
16 and  
17 performing an update to a particular lock mode record of the  
18 plurality of lock mode records in response to receiving  
19 the lock access message;  
20 wherein the update indicates that the requestor has  
21 assumed the lock mode on the particular  
22 resource.

1 36. The computer-readable medium of Claim 35 wherein the step of  
2 performing an update to a particular lock mode record of the  
3 plurality of lock mode records in response to receiving the lock  
4 access message:

5 is performed prior to receiving any status message from  
6 the holder relating to the particular resource;  
7 wherein the status message is a down-convert  
8 message or a release lock message.

1 37. The computer-readable medium of Claim 35 wherein the step of  
2 performing an update to a particular lock mode record of the  
3 plurality of lock mode records in response to receiving the  
4 plurality of lock mode records in response to receiving the lock  
5 access message:

6 is performed without receiving the status message from  
7 the holder relating to the particular resource;  
8 wherein the status message is a down-convert  
9 message or a release lock message.

1 38. The computer-readable medium of Claim 35 further comprising  
2 sequences of instructions for performing the step of:  
3 receiving at the master a plurality of request  
4 messages which indicate that a plurality of requestors  
5 need the particular resource; and  
6 sending from the master to the holder the inform  
7 lock holder message wherein the inform lock holder  
8 message contains all information from the plurality of

9 request messages that is necessary for the holder to  
10 transfer the particular resource to the plurality of  
11 requestors.

1 39. The computer-readable medium of Claim 35 further comprising  
2 sequences of instructions for performing the step of:  
3 receiving at the master a message from a sender;  
4 wherein the message includes a second lock mode on  
5 the particular resource;  
6 detecting that the lock mode and the second lock mode do  
7 not match; and  
8 sending a lock status message to the sender;  
9 wherein the lock status message includes the lock  
10 mode.

1 40. The computer-readable medium of Claim 35 further comprising  
2 sequences of instructions for performing the step of:  
3 receiving at the master a second request message;  
4 wherein the request message and the  
5 second request message both  
6 contain requests for the resource  
7 in exclusive lock mode;  
8 queueing the second request message until the master



9 receives the lock access message from the  
10 requestor.

1 41. A computer-readable medium carrying one or more sequences of instructions  
2 for managing access to a resource, wherein execution of the one or more  
3 sequences of instructions by one or more processors causes the one or more  
4 processors to perform the steps of:  
5 receiving at a master a request message which indicates that a  
6 requestor needs a particular resource of a plurality of  
7 resources, where the master maintains a plurality of lock  
8 mode records corresponding to the plurality of  
9 resources;  
10 designating one holder out of a plurality of holders wherein the  
11 plurality of holders all have respective lock modes for  
12 the particular resource;  
13 sending a plurality of broadcast inform lock holder messages to  
14 the plurality of holders except for the one holder  
15 indicating that the requestor needs the particular  
16 resource;  
17 receiving a plurality of update lock messages from the plurality  
18 of holders except for the one holder;  
19 wherein the a plurality of update lock messages

20 indicates the respective lock modes of the  
21 plurality of holders;  
22 sending from the master to the one holder an inform lock holder  
23 message to indicate to the one holder that the requestor  
24 needs the particular resource;  
25 receiving a lock access message from the requestor where the  
26 lock access message indicates that the requestor has  
27 assumed a lock mode relative to the particular resource;  
28 and  
29 performing an update to a particular lock mode record of the  
30 plurality of lock mode records in response to receiving  
31 the lock access message without receiving a status  
32 message;  
33 wherein the status message is a down-convert message or a  
34 release lock message;  
35 wherein the update indicates that the requestor has assumed the  
36 lock mode on the particular resource.